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Mitchell H. Katz, MD, MPH, Director
Department of Public Health

Susan E. Fernyak, MD, MPH, Director
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San Francisco, California

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Introduction

The Chronic Hepatitis B Surveillance Report presents data collected by the San Francisco Department of Public Health (SFDPH) Chronic Viral Hepatitis Registry Project from January 1, 2007 through December 31, 2008 on persons who are chronically infected with hepatitis B. SFDPH receives confidential disease reports containing basic demographic information from laboratories and providers, as mandated by state regulation. This basic information comprises core surveillance for chronic hepatitis and is enhanced by contacting providers and interviewing persons who are chronically infected with hepatitis B. This report provides an overview of hepatitis B infection, a description of the SFDPH Chronic Viral Hepatitis Registry, and findings of both core and enhanced surveillance activities.

Acknowledgements

This report summarizes information collected by the Chronic Viral Hepatitis Registry Project, Communicable Disease Control Unit (CDCU) in 2007 and 2008. The report was written by Sue Shallow, MPH, and Amy Nishimura, MPH, with major contributions from Sandra Huang, MD. We thank the CDCU Chronic Hepatitis Team (Haroon Ahmad, MPH, Alex Leung, Martina Li, Karen Luk, Marijoyce Naguit) who conducted surveillance and follow up with laboratories, clinicians and patients, and maintained the database, Ishmael Bihl, the project Surveillance Advisor, David Stier, MD, the project Clinical Advisor, and Pat Shiono, PhD, former Project Director. We are grateful to members of the project Advisory Panel (Natalie Bzowej, MD, PhD, Lisa Johnson, MD, Mandana Khalili, MD, Kevin Man, MD, Kimberly Page, PhD, MPH, Norah Terrault, MD, MPH, Albert Yu, MD, MPH, MBA, Hans Yu, DO), who have guided the data collection methods and reviewed this report. We thank the California Emerging Infections Program and the Division of Viral Hepatitis, Centers for Disease Control and Prevention for their financial and technical support of the San Francisco Chronic Viral Hepatitis Registry project. Most of all, we thank the laboratorians, clinicians, and persons living with chronic hepatitis B who provided the information that made this report possible.

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Introduction

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Overview of Hepatitis B Infection

Hepatitis B virus (HBV) causes a liver infection that can range in severity from a mild illness lasting a few weeks to a serious, lifelong illness. HBV may be transmitted when blood, semen, or other body fluids from an infected person enters the skin or mucous membranes of a person who is not immune to HBV through immunization or prior infection. Exposure can occur through sexual contact, needle sharing, accidental needle stick, sharing items that may be contaminated with blood such as razors or toothbrushes, unprotected contact with other body fluids (e.g., drainage from open skin wounds), or contact with HBV-contaminated surfaces. Thus, in addition to sexual contacts, household members who have prolonged, nonsexual close contact with persons with chronic hepatitis B may be at risk for exposure.[1] Hepatitis B virus can also be transmitted from an infected mother to her baby unless hepatitis B immunoglobulin and hepatitis B vaccine are given to the infant promptly at birth, followed by completion of a full hepatitis B vaccine series according to the schedule recommended by the Centers for Disease Control and Prevention (CDC) and the Advisory Committee on Immunization Practices. [2]

Acute HBV infection may be asymptomatic, particularly in children <5 years of age and immunosuppressed persons, or may cause an illness that typically begins three months after exposure (range, 60-150 days) and lasts for two to four months. Symptoms of acute infection include nausea, vomiting, loss of appetite, low-grade fever, abdominal pain, jaundice, dark-colored urine, and light-colored stools. Approximately 95% of adults and children >5 years of age are able to eliminate the virus from the blood and are immune to reinfection. However, chronic HBV infection occurs more frequently in younger individuals: approximately 90% of infected infants and 25-50% of children infected at age 1 to 5 years will become chronically infected. Persons who are immunosuppressed at the time of infection are also more likely to develop chronic hepatitis B. HBV persists in the liver and may also be found in the bloodstream and in body secretions (semen) of chronically infected persons. Persons with chronic hepatitis B are at increased risk of developing severe liver complications such as cirrhosis, liver failure, and liver cancer. The CDC reports that from 2000-2003, HBV infection was the underlying cause of an estimated 2,000-4,000 deaths annually, mostly from cirrhosis and liver cancer. [1]

The incidence of acute hepatitis B has decreased in the United States from 11.5 cases per 100,000 population in 1985 to 1.6 in 2006, when an estimated 46,000 persons became newly infected with HBV. The greatest declines in acute hepatitis B have occurred in children and adolescents since 1990, when routine vaccination of children was implemented. However, the burden of chronic hepatitis B remains high: in 2008, the CDC estimated that 0.3%-0.5% of U.S. residents, or 800,000-1.4 million persons, are chronically infected with HBV, 47%-70% of whom were born in other countries. [1]

The prevalence of chronic HBV infection varies substantially by country. Highly endemic regions are defined by a prevalence of hepatitis B surface antigen (HBsAg) that is ≥8% ;

intermediate HBV endemicity is defined as a HBsAg prevalence of 2%-7%; and low HBV endemicity is defined as a HBsAg prevalence of <2%. Eighty-eight percent of the world's population live in countries of high or intermediate endemicity for HBV, including many countries in Asia, Africa, Eastern Europe, the Middle East, and the Pacific Islands, as well as some countries in Central and South America and the Caribbean. In September 2008, the CDC updated guidelines for identifying persons with chronic hepatitis B infection. Testing for HBsAg is now recommended for persons born in regions of intermediate or high endemicity for HBV, U.S.-born persons who were not vaccinated as infants and whose parents were born in regions with high HBV endemicity, injection drug users, men who have sex with men, persons with elevated liver enzymes alanine aminotransferase (ALT) or aspartate aminotransferase (AST) of unknown etiology, and persons with certain medical conditions that require immunosuppressive therapy. Testing for HBsAg continues to be recommended for pregnant women, infants born to mothers who test positive for HBsAg, household contacts and sexual partners of HBV infected persons, persons with HIV, and persons who may have been the source of body or blood exposure.[1]

San Francisco Chronic Viral Hepatitis Registry

In 2005, the SFDPH received funding from the CDC to develop a population-based registry of persons in San Francisco with chronic hepatitis B infection. SFDPH was able to build upon a pre-existing database that contained limited information from the first laboratory report of suspected chronic hepatitis B reported on an individual between 1984 and 2004. Beginning in 2005, standardized protocols were implemented for data entry in a longitudinal, person-based information system that contains all positive hepatitis B test results that are reported for San Francisco county residents and for persons whose residence is not known to be in another jurisdiction. The data that SFDPH receives from laboratories and clinicians represent core surveillance for chronic hepatitis and includes basic demographic information (name, sex, age, address) and hepatitis B test results.

SFDPH also received CDC funding to conduct enhanced surveillance for chronic hepatitis B. By directly contacting clinicians and patients, SFDPH can acquire information unavailable through routine public health reporting to better characterize the population of San Franciscans who are chronically infected with hepatitis B, including detailed demographics and risk factors for infection. Enhanced surveillance via direct contact also enables SFDPH to educate persons with chronic hepatitis B infection about their disease and preventing transmission of the infection to their close contacts, and to provide current public health guidance to clinicians who care for patients with chronic hepatitis B.

Methods

Laboratorians, clinicians and other mandated reporters report positive results of tests for hepatitis B to the SFDPH in compliance with Title 17, California Code of Regulations (CCR), Sections 2500 and 2505. In addition to reporting test results, laboratories and providers are required to report patient identifiers (e.g., name, date of birth, gender, medical record number) and provider identifiers (e.g., name, facility, address). The SFDPH stores the reported information in a secure electronic database, organized by the person reported.

CDC laboratory criteria for diagnosis are applied to test results to identify persons with probable and/or confirmed chronic hepatitis B. CDC defines a *probable* case of chronic hepatitis B as a person with a single positive hepatitis B surface antigen (HBsAg), positive HBV DNA, or positive hepatitis B e antigen (HBeAg) with no IgM antibody to hepatitis B core antigen (IgM anti-HBc) test reported. A *confirmed* case of chronic hepatitis B is a person who: a) has a single positive HBsAg, positive HBV DNA, or positive HBeAg test with a negative IgM anti-HBc or, b) tests hepatitis B surface antigen positive, HBV DNA positive, or hepatitis B e antigen positive two times at least six months apart.[3]

For this report, age is defined as the age of the person at the time that the first positive hepatitis B report is received by the SFDPH. Age is calculated by subtracting the date of birth from the date of first notification of the case to SFDPH, then dividing the difference by 365.25 (the .25 accounts for leap years). The number and percent of persons for whom age is unknown is shown in a table footnote.

Race is classified as American Indian/Alaska Native, Asian/Pacific Islander (A/PI), African American (Black), White or Other. The number and percent of persons for whom race is unknown is shown in a table footnote. Hispanic ethnicity was rarely reported and thus is not included in the data tables.

Beginning in 2008, a subset of San Francisco chronic hepatitis B cases were interviewed by telephone as part of enhanced surveillance activities. The main goals of the surveillance interviews were to better characterize the population of San Francisco residents with chronic HBV infection and to provide public health follow-up to prevent the spread of HBV.

Twenty-five percent of probable or confirmed chronic hepatitis B cases were randomly selected from hepatitis B cases reported to the SFDPH Chronic Viral Hepatitis Registry from October 1, 2007 through December 31, 2008. Individuals with multiple hepatitis B tests reported from October 1, 2007 through December 31, 2008 were eligible to be included in the sample based on their earliest reported test in that time period.

Following selection for enhanced follow-up, a one-page data collection form was faxed to the health care provider who ordered the most recent positive HBV test to request patient locating information, race/ethnicity, primary language and pregnancy status and to notify them that SFDPH will contact their patient. Cases were ineligible for enhanced surveillance interview follow-up if they were found to be a resident of another county, if their clinician asked SFDPH not to contact them, if they were found to have an acute case of hepatitis B, if the lab test was discovered to be a false positive, or if they were deceased.

Using a structured telephone interview, eligible persons were asked about demographic information, including race/ethnicity, country of birth and primary language, as well as questions about health services received for hepatitis B, disease status and risk factors for acquisition of HBV. Hepatitis B education and counseling were offered by phone and contacted cases were also sent educational materials and community resources for testing and vaccination in the desired language(s). Cantonese-speaking interviewers conducted interviews in Cantonese and a third party interpretation service was used to conduct interviews in other non-English languages. Interviews for children 18 years and younger were conducted with a parent of the child and omitted questions involving recreational drug use and sexual activity. Cases who stated that they were unaware of their HBV diagnosis were given a shortened interview which focused on demographic information and the clinician was notified about the case's unaware status. Attempts were made to re-contact these unaware cases to complete the interview at least three months after the initial interview.

Data collected and summarized in this report is kept strictly confidential. SFDPH is authorized by law to collect information on cases of chronic hepatitis B for the purpose of controlling or preventing disease including: the reporting of disease, the conduct of public health surveillance, public health investigation and public health intervention.[4] SFDPH employees have a legal and ethical responsibility to protect the confidentiality of protected health information, and to use that information only in the performance of their jobs.

Data Limitations

1. **Reporting gaps:** Complete identification of chronic hepatitis B cases depends on complete reporting by laboratories and clinicians. All reports of positive HBV test results received by SFDPH in 2007 and 2008 came from laboratories, which are mandated to report HBsAg by Title 17, California Code of Regulations (CCR). Under-reporting by laboratories is believed to be minimal as the majority have automated processes for fulfilling their legally mandated obligations to report to SFDPH. Although Title 17, CCR also mandates reporting of chronic hepatitis B by clinicians, SFDPH has not received reports of chronic hepatitis B from clinicians during this period. There are likely San Francisco residents with chronic hepatitis B who did not receive laboratory testing for hepatitis B during this period, and whose treating clinician did not report their condition. Information about these persons is therefore missing from this report.

Finally, the data presented may include persons who have left San Francisco or who have died after they were reported to the SFDPH.

2. **Missing information:** Laboratory information systems frequently do not receive or store information about patient race and ethnicity, resulting in a large proportion of chronic hepatitis B cases reported with unknown race and ethnicity. Since 2006, SFDPH has been able to supplement race information by collaborating with two large laboratories to establish a link between their laboratory information systems and the demographic data from the clinical records and report that information electronically. Through the enhanced surveillance interviews on a subset of cases, SFDPH was also able to obtain race information by self-report.

Similarly, some laboratory reports are missing the patient's address. For approximately 20% of persons who were reported to SFDPH in this period, their residence was unknown. Information about cases whose county of residence was unknown was included in this report, along with cases that are known to live in San Francisco. Through enhanced surveillance follow-up an estimated 9% of persons in the random sample were found to be residents of another jurisdiction. Thus, the core surveillance data presented may slightly overestimate the number of San Franciscans who were reported with chronic hepatitis B during this period.

3. **Duplication:** SFDPH follows procedures to minimize duplicate records for persons whose laboratory results may be submitted with slight variations in name spelling (e.g., use of middle initial, typographic error). However, in some instances it may not be obvious that two different names belong to the same person, so two cases will be recorded instead of one. This would lead to a slight overestimate of the number of persons who were reported with chronic hepatitis B in this period. Conversely, in some situations, information from a case may have been erroneously matched and joined to the information from another case, leading to potential underestimation of the number of chronic hepatitis B cases reported in this period. The magnitude of potential error caused by incorrect deduplication of similar records is estimated to be between -2% and + 2%.[5]

4. **Surveillance data do not measure prevalence of chronic hepatitis B:** The data presented are not an estimate of the prevalence of chronic HBV infection in San Francisco residents. To estimate the prevalence of chronic HBV infection in San Francisco during a defined period, one must identify and enumerate persons who (a) are infected but have never been tested for HBV, (b) were previously tested and reported to SFDPH before 2007 but were not reported in 2007-2008 and who still live in San Francisco, and (c) those who have never been reported to SFDPH because they resided elsewhere (e.g., in another country) at the time of their diagnosis. One method of obtaining prevalence estimate would be to actively survey and test a representative sample of the San Francisco population for HBV infection. However, the data in this report only reflect the number of people infected with HBV who were tested and whose positive test was reported to the SFDPH in 2007 and/or 2008. San Franciscans who are chronically infected with

HBV may not have been tested in 2007 or 2008 because they did not access health care in this period, because no symptoms or risk factors were recognized, or because they were diagnosed before 2007 but were not being tested during this period. In addition, some persons who were tested anonymously may not have been reported to SFDPH. Thus, the data presented in this report very likely underestimates the number of persons who are chronically infected with HBV in the county. Prevalence rates based on HBV tests reported in this period would not be valid and thus are not calculated.

5. **Surveillance data do not measure incidence of chronic hepatitis B:** The data presented are not an estimate of the incidence rate of chronic hepatitis B cases in 2007-2008. Incidence rate is the number of newly infected persons occurring within a defined time in a defined geographical area. While SFDPH does identify the first date the case was reported to them, this date is not necessarily the date the case became infected or was newly diagnosed. For example, some cases may have been infected many years ago but had no symptoms and were not tested when newly infected, but were tested in 2007-2008 because a clinician was following recommended screening practices or because symptoms of chronic hepatitis have developed.

6. **Limitations of enhanced surveillance interviews:** A 25% random sample of reported chronic hepatitis B cases were selected for enhanced surveillance interview in order to obtain information that would be representative of diagnosed, reported persons with chronic hepatitis B in San Francisco. Full or partial interviews were conducted with 76% of the sample but could not be completed for all eligible cases. The results may have been affected by selection bias if the 24% of cases who were not interviewed differed substantially from interviewed cases. Another limitation of the data is that information about their medical history was obtained by patient interview and was not validated against medical records, and is thus subject to patient recall bias.

Epidemiology of Chronic Hepatitis B in San Francisco

Core Surveillance Data

From January 1, 2007 through December 31, 2008, SFDPH received over 10,000 positive hepatitis B laboratory reports on 5,815 individuals. Of these 5,815 individuals, 2,506 were newly reported to SFDPH. More newly reported cases were reported in 2008 (1,307) than in 2007 (1,199). Of the 5,815 cases reported in 2007 and 2008, 1,970 (33.9%) met the CDC laboratory criteria for a probable case of chronic hepatitis B and 3,845 (66.1%) met the CDC laboratory criteria for a confirmed case of chronic hepatitis.

Data presented in Tables 1.1 and 1.2 below are for all probable and confirmed cases of chronic hepatitis B with at least one test reported to SFDPH in 2007 or 2008. These data do not represent the number of incident or prevalent infections (see limitations section). More cases were male (52.8%) and between the ages of 25-54 years (69%) when they were first reported to SFDPH

(Table 1.1). Of the 70% of cases for whom race was known, 86.3% of cases were Asian/Pacific Islander (A/PI) (Table 1.2).

Table 1.1. Age group of reported chronic hepatitis B cases, 2007- 2008*

Age group, years	N	%
<2	7	0.1%
2-4	13	0.2%
5-14	63	1.1%
15-24	502	8.7%
25-34	1,413	24.4%
35-44	1,370	23.7%
45-54	1,219	21.0%
55-64	762	13.2%
65+	445	7.7%
Total	5,794	100%

*Age data missing for 21 (0.4%) of cases

Table 1.2. Race of reported chronic hepatitis B cases, 2007- 2008§

Race	n	%
Asian/Pacific Islander	3,524	86.3%
White	313	7.7%
African American	167	4.1%
American Indian/Alaska Native	11	0.3%
Other	69	1.7%
Total	4084	100%

§Race data missing for 1,731 (30.0%) of cases

Enhanced Surveillance Data

Public health follow-up was conducted on a random 25% sample of the 4,268 probable or confirmed chronic hepatitis B cases reported to the SFDPH from October 1, 2007 through December 31, 2008. Of the 903 cases eligible for interview (see methods section for exclusion criteria), full or partial interviews were conducted with 684 (76%). Fourteen percent of cases were unable to be contacted, 6% refused to be interviewed, 3% had missing or invalid locating information and 1% were homeless, incarcerated, or did not have access to a phone and therefore could not be interviewed by telephone. Six percent of the cases stated that they were unaware of their chronic hepatitis B diagnosis; for these cases, SFDPH conducted a shortened interview to obtain demographic data and provide information about hepatitis B. SFDPH did not collect information about hepatitis B-related health services received, health characteristics and risk factors for hepatitis B from cases who were unaware of their diagnosis.

Tables 2.1 and 2.2 below present demographic data for all cases that completed a full or shortened interview. Tables 2.3 and 2.4 below present data for hepatitis B-related health services received and risk factors for hepatitis B infection for cases who completed an interview and were aware of their HBV diagnosis.

Demographic Characteristics

Fifty-one percent of interviewed cases were male and 45% were 15-44 years of age. Eighty-nine percent were of A/PI race, of whom 83% were Chinese, 6% were Vietnamese and 5% were Filipino (Table 2.1).

Table 2.1. Demographic characteristics of interviewed chronic hepatitis B cases in San Francisco, 2007-2008

Characteristic	n	%
Gender (n=684)		
Male	351	51.3%
Female	333	48.7%
Age group, years (n=684)		
<2	2	0.3%
2-4	1	0.1%
5-14	2	0.3%
15-24	38	5.6%
25-34	117	17.1%
35-44	155	22.7%
45-54	175	25.6%
55-64	129	18.9%
65+	65	9.5%
Race (n=684)		
Asian/Pacific Islander	607	88.7%
White	38	5.6%
African American	19	2.8%
American Indian/Alaska Native	2	0.3%
Other	16	2.3%
Unknown	2	0.3%
Asian Ethnicity (n=607)		
Chinese	503	82.9%
Vietnamese	34	5.6%
Filipino	30	4.9%
Korean	6	1.0%
Other	31	5.1%
Unknown	3	0.5%

Eighty-seven percent of cases were foreign-born and of these, over 90% were born in countries highly endemic for HBV infection (Table 2.2). Primary language was reported as Cantonese for 56% of respondents and English for 18% of respondents.

Table 2.2. Country of birth and primary language of interviewed chronic hepatitis B cases in San Francisco, 2007-2008

Characteristic	n	%
Country of Birth (n=684)		
China	433	63.3%
USA	89	13.0%
Vietnam	70	10.2%
Philippines	30	4.4%
Burma	12	1.8%
South Korea	7	1.0%
Other	38	5.6%
Unknown	5	0.7%
Primary Language (n=684)		
Cantonese	386	56.4%
English	126	18.4%
Mandarin	28	4.1%
Vietnamese	27	3.9%
Tagalog	17	2.5%
Other/Multiple	93	13.6%
Unknown	7	1.0%

Hepatitis B-Related Health Services and Selected Health Characteristics

Eighty-three percent of interviewees reported having health insurance (Table 2.3). At the time of interview, 65% reported they had ever received an abdominal ultrasound to check for liver cancer, 42% reported ever visiting a gastrointestinal (GI) or liver specialist for hepatitis B, 24% had ever taken prescription medication to treat HBV, 24% said that they had received the hepatitis A vaccine and 13.5% reported having a liver biopsy. Less than 2% of interviewees had been told by a doctor that they had liver cancer.

Among women of childbearing age (12-52 years), 12% were pregnant at the time of interview. Cases that were pregnant were referred to the San Francisco Perinatal Hepatitis B Coordinator for follow-up to ensure that their infants would receive hepatitis B immune globulin and vaccination according to the recommended schedule. Eight individuals (<1% of random sample) were deceased and not eligible for interview. Of the six individuals for whom death certificates were obtained, two listed sequelae of chronic hepatitis infection (hepatocellular carcinoma, end stage liver disease) as a cause of death, three did not list HBV infection or sequelae of chronic

hepatitis infection as a cause of death and one individual's cause of death was pending. Cause of death may or may not be related to chronic hepatitis B infection for individuals where cause of death is missing or unknown.

Table 2.3. Health services received for hepatitis B and selected health characteristics of interviewed chronic hepatitis B cases in San Francisco, 2007-2008

Characteristic (n responding)	Yes		No		Unknown	
	n	%	n	%	n	%
Health insurance (n=621)	513	82.6%	106	17.1%	2	0.3%
Abdominal ultrasound to check for liver cancer (n=618)	400	64.7%	200	32.4%	18	2.9%
Visited GI or liver specialist for HBV (n=618)	259	41.9%	345	55.8%	14	2.3%
Took medication for HBV (n=619)	148	23.9%	465	75.1%	6	1.0%
Said they received hepatitis A vaccine (n=610)	146	23.9%	285	46.7%	179	29.3%
Liver biopsy (n=616)	83	13.5%	518	84.1%	15	2.4%
Pregnant (n=209)*	26	12.4%	182	87.1%	1	0.5%
Told by MD they have liver cancer (n=609)	10	1.6%	589	96.7%	10	1.6%

*Asked only of females 12-52 years of age.

Table 2.4 shows lifetime risk factors reported by interviewees. Reported risk factors are not mutually exclusive; respondents could report more than one risk factor. Additionally, the presence of a risk factor does not necessarily indicate the source of HBV infection. Many respondents report having had close contact with someone who has hepatitis B: 32% reported sharing a residence with someone who has hepatitis B, 15% reported maternal HBV infection, and 6% reported sexual contact with someone who has hepatitis B. Approximately 30% of people did not know the hepatitis B status of their close contacts. Eleven percent of male respondents reported they were men who had sex with men (MSM), 8% of all respondents reported having ever been treated for a sexually transmitted disease (STD), and smaller percentages of respondents reported a history of injection drug use, incarceration or kidney dialysis.

Table 2.4. Lifetime risk factors of interviewed chronic hepatitis B cases in San Francisco, 2007-2008

Characteristic (n responding)	Yes		No		Unknown	
	n	%	n	%	n	%
Household contact with HBV (n=608)	196	32.2%	235	38.7%	177	29.1%
Mother with HBV (n=608)	92	15.1%	313	51.5%	203	33.4%
MSM (n=154)*^	17	11.0%	137	89.0%	0	0.0%
Treatment for STD (n=592)	48	8.1%	533	90.0%	11	1.9%
Sexual partner with HBV (n=597)	36	6.0%	381	63.8%	180	30.2%
Incarceration (n=599)	20	3.3%	579	96.7%	0	0.0%
Injection Drug Use (n=318)*	6	1.9%	312	98.1%	0	0.0%
Kidney Dialysis (n=603)	7	1.2%	591	98.0%	5	0.8%

*Added to questionnaire July 1, 2008. ^Asked only of males.

Discussion

According to U.S. Census data, approximately 27%[6] of San Francisco's population of 842,625[7] were born in countries with high or intermediate endemicity for HBV.[8] As expected, chronic hepatitis B infection is commonly reported in San Francisco, with 5,815 cases reported in 2007 and 2008.

The excellent response to interviews of persons with chronic hepatitis B has provided a more complete picture of the epidemiology of chronic HBV infection in San Francisco. Persons of A/PI race, who comprise 31% of the city's population but an estimated 89% of the chronic hepatitis B cases, are disproportionately affected.[7] Most are foreign-born and over half do not speak English as their primary language. At least half of reported chronic hepatitis B cases were 15-44 years of age, an age group in which both males and females may be more likely to transmit HBV through sexual activity and in which women may transmit HBV perinatally. Infected persons who were foreign-born were born in countries highly endemic for HBV infection where they likely acquired HBV at birth or during early childhood. Having a mother or other close contact infected with HBV were the most frequently reported risk factors among interview respondents. However, one-third of respondents did not know whether their close contacts were infected with hepatitis B, which may suggest knowledge gaps among cases about recommended measures to prevent transmission to their contacts (e.g., testing and vaccination).

Although over 80% of respondents stated they had health insurance, the type and level of coverage provided for hepatitis-related monitoring and treatment was not determined. Because the information about health services received for hepatitis B was obtained by patient self-report and not medical chart review, it is not possible to evaluate whether the levels of hepatitis-B related health services were appropriate. For example, although only 24% of cases interviewed said that they had received the hepatitis A vaccine, it is possible that a substantial proportion of

those who did not recall receiving hepatitis A vaccination were already immune through prior infection in their country of origin.

Although cases of chronic hepatitis B are found among all race groups in San Francisco, Asian/Pacific Islanders bear the largest burden of chronic HBV infection, highlighting the need to provide culturally and linguistically appropriate public and patient education about hepatitis B prevention for A/PI communities. Efforts to raise awareness about hepatitis B prevention and treatment in the A/PI and clinical communities have been undertaken by SF Hep B Free, a citywide campaign that began in 2007 to promote hepatitis B testing and vaccination of all A/PI persons in San Francisco.